mode of arrangement of atoms in a molecule, sometimes only as condensed statements of facts of formation and decomposition. If the former view be adopted it becomes a question whether the "structure" represented by the formula is that of the molecule when unacted upon by the molecules of foreign bodies, or only when a certain disposition of its parts has been induced by the action of the molecules of another substance.

Facts are certainly known which are best explained by supposing that a change of some kind precedes that process of complete molecular decomposition usually called a chemical reaction; indeed almost the only feasible hypothesis of chemical action supposes that chemical change—that is, change among the parts of the molecule—may be proceeding without a permanent molecular decomposition taking place. In the section on "Aldehydrols" the authors apparently admit some such hypothesis as this; they do not regard the non-isolation of a compound as proof of the non-existence of that compound; they explain processes of chemical change by supposing the existence of unstable molecular configurations intermediate between more stable and isolable configurations.

Recent work in chemical physics appears to lend some countenance to the idea that structural formulæ may roughly represent the configuration of molecules just previous to their passage into phases of "absolute instability" rather than their configuration when in phases which are themselves "absolutely stable."

Quite recently a distinct advance has been made in molecular theories by the recognition of what might be called *atomic induction*, that is, the influence exerted by one part of a molecule in modifying the chemical function of another part, or other parts, of the same molecule. Illustrations of this "orientation" are to be found in the production of the substituted derivatives of benzene and of the phenols; the generalisations made in these cases are clearly stated by the authors.

A very valuable section on the Van't Hof Le-Bel hypothesis of isomerism is to be found from pp. 983 to 993. (There is evidently an omission of part of a sentence at the top of p. 993.) The authors suggest a slightly modified form of this hypothesis. The fundamental assumption is made in these hypotheses that chemical energy is entirely potential, and that it is wholly due to the arrangement of the parts of the molecules. It seems possible however that chemical energy may be partly potential and partly kinetic, and that if any means could be found for measuring the change of entropy as well as the change of total intrinsic energy of chemical systems in their passage from one standard state to another, some light might be thrown on the question of isomerism.

In their general classification of carbon compounds the authors have adopted a scheme founded on the chemical function of these compounds; they group together hydrocarbons, alcohols, aldehydes, &c. They do not fail to indicate how function is associated with "structure." But in each of these great groups of compounds a classification founded more upon genetic relations is adopted; they consider a group of hydrocarbons, then the haloid derivatives of these hydrocarbons, and so on.

Most admirable tables are appended to all the more important groups; the usefulness of these tables may be illustrated by reference to that on pp. 458-459, wherein the ethylic alcohols are arranged in *really* homologous series.

The acids are classified into various sub-groups, and the dependence of the function of the "acid hydrogen" on the "structure" of the other part of the molecule is indicated.

In speaking of the higher aromatic or "benzenoid" hydrocarbons, the happy expression is used of a closed chain containing "*loops*," and it is pointed out that "the formation of each new loop in the chain of carbon atoms tends to reduce the combining power by two units."

The proof (p. 399) that the carbon atoms in the olefines are not arranged in a closed chain is noteworthy, and may be taken as typical of the authors' method of dealing with such questions; basing a generalisation on carefully collected facts, and then applying their generalisation boldly, but without dogmatism.

The nomenclature of the work before us is much more self-consistent than that adopted in any other treatise on organic chemistry. Certain new names are introduced: thus, the bodies supposed to exist in aqueous solutions of many aldehydes—substances characterised by the groups $CH(OH)_2$—are called *aldehydrols*. A systematic nomenclature for the carbohydrates is proposed: those of the composition $C_6H_{12}O_6$ have names ending in *ose*, glucose being the best known example of this class; those of the composition $C_{12}H_{22}O_{11}$, which like cane-sugar produce two molecules of glucose on inversion, have names ending in *on*, *e.g.*, saccharon; and those which on hydration give rise to the formation of a saccharon have names ending in *yn*, *e.g.*, amylin. As another instance of the authors' attempt to systematise nomenclature may be noted their rules for the use of the Greek letters α, β, &c., in distinguishing isomeric derivatives (pp. 861-2, *note*).

Finally, I would draw attention to the authors' manner of dealing with physical methods of solving chemical problems: the physical method is so described that one cannot forget that it is to be used by a chemist—there is not first a little physics, and then a little chemistry; the problem is clearly chemical, the method only is physical.

A suggestion made in the preface seems most admirable, it is that "Each chemical school" would do well to "make the preparation by its students of certain substances in a state of purity a part of the ordinary course of study, and to give notice that these particular compounds are at the disposal of experts for the determination of physical constants."

Is there any probability of a treatise being written on Inorganic Chemistry conceived in the same spirit and carried out, as far as possible, on general lines similar to those of this most excellent work by Armstrong and Groves?

M. M. PATTISON MUIR

OUR BOOK SHELF

An Elementary Treatise on Solid Geometry. By W. Steadman Aldis, M.A. (Cambridge: Deighton, Bell, and Co., 1880.)

THE term "elementary" diagnoses this handy book to solid geometry from the more thorough works on the same subject by Messrs. Salmon and Frost. It is, to our mind, exceedingly well adapted to the requirements of that large class of students who, whilst requiring an acquaintance with this branch of study, are unable, either

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through want of time or the requisite ability, to extend their reading into the more recondite parts discussed by the above-named writers. As a proof that Mr. Aldis's labours have been appreciated, we need only say that this edition, improved by the addition of hints for the solution of some of the examples, is the third.

Familiar Wild Flowers: Figured and described by F. Edward Hulme. 2nd Series. With Coloured Plates. (London: Cassell, Petter, Galpin, and Co.)

WE have already called attention to the appearance of the first volume of this series, and of the second we can speak in equally favourable terms. In selecting for illustration a hundred of our familiar wild flowers, all chosen in some way for their beauty, a certain amount of arbitrariness must be allowed; but in the present instance very little complaint will be made on this head by the majority of readers. The coloured lithographs are somewhat unequal in excellence, but, as a rule, are extremely good. The book is one well adapted to awaken or to foster in young people a love of the floral beauties of our fields and hedges, woods and ditches.

A New and Easy Method of Studying British Wild Flowers by Natural Analysis. By Frederick A. Messer. (London: D. Bogue, 1880.)

THIS work indicates a very large amount of labour on the part of the author; whether the labour has been altogether well applied is another question. For the field botanist whose sole object is to determine the name of a wild flower it will no doubt be useful in assisting him to make out at least the order and genus, for beyond this it does not pretend to go. No botanist will be disposed to depreciate the value of field botany and of the study of critical species, which often leads to further study of some of the great questions connected with the life of plants. There is no doubt that species-botany had been exalted a quarter of a century ago to a far too prominent place by English workers, and had been much too exclusively followed, to the disregard of morphological and especially of physiological work. The inevitable reaction has set in, and is now perhaps at its height, when the number of botanists who have an accurate acquaintance with our British flora is extremely small. As an introductory work for those who are desirous of increasing this number, Mr. Messer's book may be recommended, always provided that the student does not imagine that it will materially help him in his study of the structural and genetic affinities of the different families of plants. The graphic illustrations are novel in design, and will no doubt help to impress the meaning of the technical terms on the beginner. Some few errors should not have been allowed to pass in a work bearing the date of the present year. Among these is the reference of *Selaginella selaginoides* to the genus *Lycopodium*, and the complete suppression of Selaginellaceæ as a British order of vascular cryptogams.

Manual of the Indigenous Grasses of New Zealand. By John Buchanan, F.L.S. (Wellington: James Hughes, 1880.)

THIS is one of those excellent manuals emanating from the Colonial Museum and Geological Survey Department of New Zealand under the admirable direction of Dr. Hector. The work is a reproduction in a handy form of the folio work ordered by the New Zealand Government in 1876, to be prepared "with nature-printed plates and descriptions of each species, and to be accompanied by an essay on the grasses and forage plants likely to prove useful in New Zealand." This explanation is extracted from the preface of the book before us, which preface has been written by Dr. Hector himself. We also learn from the same source that "the whole of the illustrations of the large edition were drawn from nature by Mr. John Buchanan. . . . The condition imposed—that the plates should be nature printed—rendered it necessary in the first instance to publish the work in folio, but, as this large size is both inconvenient and costly, only a small edition has been issued, and the present handy volume has been printed for more general distribution. The plates now given—sixty-four in number, and including eighty-seven different species and varieties of grasses—are reductions by the process of photo-lithography from the original folio plates, and depict the grasses as of one half the natural size of the original specimens."

There can be no doubt but that the book will be very valuable, not only to the botanist, but also to those who wish to know all about New Zealand grasses for their utility for fodder or for other purposes. The plan adopted in the book is to give under each genus a brief generic description and general distribution over the world, the names of the countries being given in capitals, so that they catch the eye at once; this is followed by the etymology of the generic name. The species are then separately enumerated, the generic and specific names standing first, followed by the common name, reference to the plate, synonyms, habit of the plant, time of flowering, specific description and distribution of the particular species, after which is a good account of the properties and uses of the grass, and a detailed reference to the figures. The book is extremely well printed, the plates are well done, and there are two capital indices, the first to genera and species, and the second to popular names.

JOHN R. JACKSON

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

Geological Climates

IN NATURE, vol. xxii. p. 200 *et seq.*, there occurs an important statement by Mr. J. Starkie Gardner, to the effect that fossil remains not distinguishable from *Araucaria Cunninghami* had been found among the Eocene plant beds of Bournemouth, in the south of England.

After reading Mr. Gardner's paper, I availed myself of an opportunity of studying the leaflets of the living and dead specimens of this species of *Araucaria* in the Kew Gardens, including the original specimens in the Herbarium named by Mr. Cunningham, and agree with Mr. Gardner as to the difficulty of separating the *A. Cunninghami* from the Sequoias by leaflets alone when in the fossil condition.

Assuming Mr. Gardner's conclusion to be true, viz., that the Eocene Bournemouth tree was identical, or nearly so, with the living *A. Cunninghami*, a question arises as to climate which will prove insoluble to geologists of the school of Lyell and his followers, who assume that all physical causes during geological time have been pretty much the same as at the present time and times immediately preceding the present.

The Moreton Bay Pine (*A. Cunninghami*) is found, as the name imports, on the shores of Moreton Bay, on the east coast of Australia, and has a range of 900 miles, from 14° S. lat. to 29° 30′ S. lat. along that coast. It does not extend more than eighty miles inland, where, instead of being 130 feet in height, which it is on the coast, it becomes a dwarf tree, and farther inland it entirely disappears.

This tree therefore becomes a most delicate self-registering thermometer, indicating to us precisely (after the well-known manner of plants) the exact conditions of the Eocene climate that existed in Bournemouth during the earlier Tertiary period. I propose to examine the evidence given by this thermometer, and to invite my *uniformitarian* friends to explain how this evidence can exist in conformity with their views.

The climate of the northern limit of the Moreton Bay Pine is as follows (as regards heat):—

Mean (January).	Mean (July).	Mean (Annual).
82°·0 F.	71°·0 F.	76°.5 F.

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